

What is claimed is:

- 1 1. A method comprising:
2 obtaining a semiconductor structure having a metal disposed thereon; and
3 etching at least a portion of the metal using an etching fluid while applying sonic
4 energy to the etching fluid.
- 1 2. The method of claim 1, further comprising:
2 depositing a metal layer on the structure, the deposited metal layer forming
3 reacted and unreacted metal regions, wherein the etching comprises etching at least a
4 portion of the unreacted metal regions.
- 1 3. The method of claim 1, wherein the obtaining comprises obtaining a
2 semiconductor structure having a germanium substrate.
- 1 4. The method of claim 1, wherein the obtaining comprises obtaining a
2 semiconductor structure having a region containing germanium.
- 1 5. The method of claim 4, wherein
2 the obtaining comprises obtaining a semiconductor structure having nickel
3 disposed thereon, and
4 the etching comprises etching at least a portion of the nickel while applying sonic
5 energy to the etching fluid.

1 6. The method of claim 1, wherein
2 the obtaining comprises obtaining a semiconductor structure having nickel
3 disposed thereon, and
4 the etching comprises etching at least a portion of the nickel while applying sonic
5 energy to the etching fluid.

1 7. The method of claim 1, wherein the obtaining comprises obtaining a
2 semiconductor structure having a germanium region and nickel disposed over the
3 substrate.

1 8. The method of claim 1, wherein the applying the sonic energy comprises
2 applying ultrasonic energy.

1 9. The method of claim 1, wherein the applying sonic energy comprises
2 applying megasonic energy.

1 10. The method of claim 1, wherein the etching comprises etching without
2 using an oxidant in the etching fluid.

1 11. A method comprising:
2 obtaining a semiconductor structure having nickel disposed thereon and a region
3 containing germanium; and
4 etching at least some of the nickel using an etching fluid while applying sonic
5 energy to the etching fluid.

1 12. The method of claim 11, further comprising:
2 depositing the nickel on the semiconductor structure to form nickel germanide in
3 at least one region and unreacted nickel in another region; and
4 etching to remove at least some of the unreacted nickel.

1 13. The method of claim 11, wherein the obtaining comprises obtaining a
2 semiconductor structure having a germanium substrate.

1 14. The method of claim 1, wherein the obtaining comprises obtaining a
2 semiconductor structure having a silicon substrate having at least one germanium region.

1 15. The method of claim 11, wherein the etching comprises etching without
2 using an oxidant in the etching fluid.

1 16. The method of claim 11, wherein the applying the sonic energy comprises
2 applying ultrasonic energy.

1 17. The method of claim 11, wherein the applying sonic energy comprises
2 applying megasonic energy.

1 18. A method comprising:
2 obtaining a semiconductor structure having a germanium region and a metal
3 disposed on the semiconductor structure; and
4 etching at least a portion of the metal while applying sonic energy to an etching
5 fluid.

1 19. The method of claim 18, further comprising:
2 depositing a metal layer on the semiconductor structure to form a metal germanide
3 in a first region and unreacted metal in a second region, wherein the etching comprises
4 etching at least a portion of the second region.

1 20. The method of claim 18, wherein the obtaining comprises obtaining a
2 semiconductor structure having a germanium substrate.

1 21. The method of claim 18, wherein the obtaining comprises obtaining a
2 semiconductor structure having a silicon substrate having a germanium region.

1 22. The method of claim 18, wherein the applying the sonic energy comprises
2 applying ultrasonic energy.

1 23. The method of claim 18, wherein the applying the sonic energy comprises
2 applying megasonic energy.

1 24. A method comprising:
2 obtaining a semiconductor structure having a region capable of being dissolved by
3 a first etching fluid that includes an oxidant; and
4 etching at least a portion of a layer deposited on the substrate using a second
5 etching fluid that does not include the oxidant while applying sonic energy to the second
6 etching fluid.

1 25. The method of claim 24, wherein the obtaining comprises obtaining a
2 substrate having a germanium region capable of being dissolved by the first etching fluid.

- 1 26. The method of claim 24, wherein the application of the sonic energy
2 provides energy to dissolve said at least a portion of the layer.
- 1 27. The method of claim 24, wherein the applying the sonic energy comprises
2 applying ultrasonic energy.
- 1 28. The method of claim 24, wherein the applying the sonic energy comprises
2 applying megasonic energy.
- 1 29. The method of claim 24, wherein the etching at least a portion of a layer
2 comprises etching at least a portion of a metal layer.
- 1 30. The method of claim 24, wherein the etching at least a portion of a layer
2 comprises etching at least a portion of a nickel layer.
- 1 31. A method comprising:
2 etching at least some of a metal disposed on a semiconductor structure using an
3 oxidant-free etching fluid; and
4 applying sonic energy to the etching fluid while etching.
- 1 32. The method of claim 31, wherein the etching comprises etching nickel.
- 1 33. The method of claim 31, wherein the etching comprises etching metal
2 disposed on a semiconductor structure comprising a germanium region.
- 1 34. The method of claim 31, wherein the applying the sonic energy comprises
2 applying ultrasonic energy.

1 35. The method of claim 31, wherein the applying the sonic energy comprises
2 applying megasonic energy.

1 36. A semiconductor structure comprising:
2 a substrate containing a germanium region;
3 a metal contact; and
4 a germanide layer located between the germanium region and the metal contact.

1 37. The semiconductor structure of claim 36, wherein the germanide layer
2 contacts the metal contact and the germanium region.

1 38. The semiconductor structure of claim 36, wherein the germanide layer
2 comprises a nickel germanide layer.

1 39. The semiconductor structure of claim 36, wherein the germanide layer
2 comprises a silicon germanide layer.

1 40. The semiconductor structure of claim 36, wherein the metal contact is
2 associated with one of a source and a drain of a transistor.